

11-1 Arithmetic Sequences

sequence--list of numbers in a particular order

numbers--terms

arithmetic sequence--sequence in which each term after the first is found by adding a constant to the previous term

constant--common difference (d)

ex:

18, 38, 58, 78, 98, ...

$$d = 20$$

$$a_1 = 18$$

$$a_2 = 38$$

$$a_3 = 58$$

$$a_6 = 118$$

Recursive--find a term using the previous term

$$a_n = a_{n-1} + d$$

$$a_6 = a_5 + d$$

Explicit--find a specific term using the first term

ex:

11, 15, 19, 23, 27

$$a_1 = 11$$

$$a_2 = 15$$

$$d = 4$$

$$a_2 = 11 + 4(1)$$

$$a_3 = 11 + 4(2)$$

$$a_4 = 11 + 4(3)$$

$$a_5 = 11 + 4(4)$$

$$a_6 = 11 + 4(5)$$

$$a_n = a_1 + d(n-1)$$

Explicit formula

n is an integer

$$a_n = a_1 + (n-1)d$$

$$a_{11} = 11 + (10)4$$

$$a_{1000} = 11 + (999)4$$

ex:

12, 5, -2, -9

Find a_n

$$d = -7$$

$$a_n = 12 + (n-1)(-7)$$

$$12 - 7n + 7$$

$$a_n = 19 - 7n$$

ex:

$$a_1 = 23 \quad d = -5$$

$$\text{Find } a_n = 23 + (n-1)(-5) = -5n + 28$$

$$\text{Find } a_5 = 3 \quad -5(5) + 28$$

$$\text{Find } a_{21} = -77$$

Do:

1. Find a_n
-3, -10, -17, -24, ...

$$a_n = 4 - 7n$$

2. 3, 11, 19, ...

Find a_{31}

$$a_{31} = 3 + (31 - 1) \cdot 8 = 243$$

3. 100, 98, 96, ...

Find a_{25}

$$(52)$$

Arithmetic Mean(s)--term(s) between
any two terms in a sequence

ex:

12, 18, 24, 30, 36

18 is the arithmetic mean between 12 and 24

24, 30 are the arithmetic means between 18 and 36

ex:

Find 3 arithmetic means between 13 and 29

13, 17, 21, 25, 29

$$29 = 13 + (4)d$$

$$4 = d$$

Do:

Find 2 arithmetic means between 6 and 27

6, 13, 20, 27

$$7 = d$$

ex:

$$a_1 = \underline{-8}$$

$$a_4 = 16$$

$$a_7 = 40$$

$$a_4 = a_1 + (n-1)d$$

$$16 = a_1 + 3(8)$$

$$-8 = a_1$$

Find d.

$$a_n = a_1 + (n-1)d$$

$$a_n = a_4 + (n-4)d$$

$$40 = 16 + 3d$$

$$24$$

$$8 = d$$

Do:

$$a_1 = \underline{-50}$$

$$a_6 = 5 \quad d = 11$$

$$a_9 = 38$$

What term is 731?

$$a_n = 731$$

$$n = \underline{72}$$

$$731 = -50 + (n-1)(11)$$

HW

p581

15-39odd